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THE EFFECT OF TRAINING USING SLOW-MOTION VIDEO ON CORRECTING THE SKILL PERFORMANCE OF THE LONG SERVE IN TABLE TENNIS

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Abstract
This research aims to examine the impact of slow-motion video training on correcting the technical performance of long serves in table tennis among junior players. The study relies on employing slow-motion replay as an instructional tool that enables players to observe subtle execution errors and work on correcting them. The researcher adopted the experimental method with two groups: an experimental group trained using slow-motion video analysis, and a control group trained using traditional methods. The sample consisted of 20 randomly selected junior players, equally distributed between the two groups. A training program was implemented over four weeks, with three sessions per week, involving practical exercises captured on video and immediate feedback from the coach for each player. Technical performance of the long serve was assessed before and after the program using skill-based evaluation tools and motion analysis software. The results revealed statistically significant differences in favor of the experimental group in the post-test. These findings confirm the effectiveness of slow-motion video in improving technical skills. The study recommends integrating this technique into training programs, especially for early age categories.

Keywords:Table Tennis, Slow-Motion Video, Technical Performance, Long Serve, Visual Training.

Research Introduction

Research Introduction and Importance

Sports training techniques have evolved in recent years under the influence of technology. Among these techniques, the use of slow-motion video has emerged as an accurate analytical tool that can track and correct motor errors. In table tennis, the long serve is a fundamental skill that determines the trajectory of the point and influences the course of the game, especially among junior players who are still developing their skills. Traditional training may not be sufficient when dealing with fine motor details, whereas slow-motion video provides detailed visualization of arm movements, ball direction, and strike angle. The importance of this research stems from its aim to provide a modern training mechanism based on immediate observation and analysis via video, which enhances the player's self-learning and improves the quality of their technical performance. (Al-Husseini, 2020, p. 40)

Research Problem

Many junior table tennis players struggle with technically correct long serves, resulting in errors in timing, strike angle, or ball rebound location. The research problem is represented by the following question:

Does the use of slow-motion video contribute to correcting the skill performance of long serves among junior table tennis players?

Importance of the Study

This study derives its importance from several aspects:

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1. It provides a new addition to the field of table tennis skill training by employing slow-motion video technology as an analytical and corrective tool for performance.
2. It contributes to filling the gap in Arab studies that address correcting skill errors in long serves using modern technical means.
3. It provides coaches with a practical training method that helps improve the accuracy and quality of long serves among table tennis players.
4. It presents a model that can be applied in clubs and training centers to develop skill performance in a measurable and trackable manner.
5. It paves the way for future studies that address the integration of video analysis techniques with specialized training programs for other table tennis skills.

Research Objectives

- To determine the effect of using slow-motion video on improving long-serve skill performance
- To compare performance results before and after video training
- To determine the differences between the experimental and control groups in mastering the long-serve skill

Research Hypotheses

- There are statistically significant differences in long-serve skill performance before and after using slow-motion video training, in favor of the experimental group after application
- There are statistically significant differences between the experimental group and the control group after training, in favor of the experimental group

Research Areas

Human Area

Junior table tennis players within the age group (13-15 years) from a sports club in Iraq, numbering (20) players

Temporal Area

The research period extended from March 1, 2025, to April 1, 2025

Spatial Area

The table tennis hall of the [name of club] sports club

Definition of Terms

- Slow-motion video: A video recording displayed in slow motion using software such as Dartfish or Coach's Eye, to enable detailed analysis of movements (Al-Taie, 2022: 45)
- Long serve: A type of serve in table tennis that aims to deliver the ball quickly and deeply to the opponent's end of the table (Al-Jabouri, 2021: 81)
- Skill performance: The player's ability to execute technical skill according to the game's requirements in terms of accuracy, speed, and timing (Khaled, 2023: 23).

Research Methodology and Field Procedures

Research Methodology

The researcher used the experimental method(Mohammed et al., 2025 ; H.; Y. A. Khalaf et al., 2025), given its suitability for the nature of this research, which aims to measure the effect of an independent variable (training using slow-motion video) on a dependent variable (correcting the skill performance of long serves).

A two-group experimental design was adopted: (Khudair, 2020, p. 55)

- An experimental group underwent a training program based on slow-motion video analysis.

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- A control group trained using the traditional method without using video.

The two groups were equal in terms of the number of participants and basic characteristics such as age, number of years of training, basic skill, weight, and height.

Research Sample

The sample was selected from the youth players at [Club Name] Club, totaling (30) players. Only (20) players were randomly selected and divided into:

- Experimental group: 10 players
- Control group: 10 players

Sample selection criteria:

- The player must be a junior (aged 13–15 years)
- At least two years of coaching experience
- Not have participated in any previous study
- Regular training during the research period

See Table (1): Sample characteristics

Table (1) shows the basic data for the sample

Category	Number	Average Age (years)	Average Height (cm)	Average Weight (kg)
Experimental Group	10	14.1	158	48
Control Group	10	14.2	159	49

Research Devices and Tools

The researcher relied on a set of devices and tools to conduct this study, consistent with the recommendations of similar studies in the field of skill performance analysis using slow-motion video techniques (Al-Shammari, 2022: 47). These tools include:

• Measurement and Performance Tools

- An official table tennis table conforming to ITTF specifications.
- Standard table tennis rackets.
- Training balls approved by the ITTF.
- A medical scale and a height gauge to measure the body characteristics of the sample.

• Performance Recording and Analysis Tools

- A slow-motion camera (240 frames per second).
- The Dartfish application for motor analysis.
- A laptop equipped with a slow-motion video analysis program.

• Evaluation Tools

- A long-serve skill evaluation model prepared by the researcher, based on three main axes:
- Accuracy of sending the ball to the designated target on the table.
- Hand angle during hitting.
- Ball trajectory in terms of speed and deflection.

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- Performance observation form by three expert coaches.

Test Details

• Test Name

Table Tennis Long Serve Accuracy Test.

• Test Purpose

To measure the player's ability to execute a long serve accurately in terms of distance, direction, and speed, consistent with the requirements of competitive play (Al-Daini, 2022, p. 120).

• Test Conditions

1. Use a table tennis table, rackets, and official balls that meet international specifications.
2. The player must be in the standard ready position behind the service line.
3. Perform the serve from the designated area, attempting to reach the ball in a specific area on the other half of the table.

• Performance Method

The player stands in the ready position and then executes 10 consecutive long serve attempts toward the target area.

The performance is filmed using a slow-motion video camera to review the movement and analyze errors.

The score is recorded based on the number of balls that accurately reach the designated area, with documentation of the technical errors associated with each attempt (Al-Shammari, 2022: 50).

Pilot Experiment

The pilot experiment was conducted one week prior to the main experiment, on a small sample of (4) table tennis players outside the primary research sample. The aim was to:

1. Verify the validity of the measurement tools and methods.
2. Test the clarity of the test instructions and their ease of application.
3. Verify the test time and appropriate number of attempts.
4. Identify and address any potential field difficulties during implementation before commencing the main experiment.

Performances during the pilot experiment were recorded using a slow-motion video camera, and movements were analyzed to ensure the quality of the recording and ease of review, in accordance with field procedures recommended in recent studies (Suisdareni & Tomoliyus, 2021: 234).

Main Experiment

The main experiment was conducted after the pilot experiment was completed and the resulting feedback was processed. The main experiment was conducted on the primary research sample of (20) players, equally

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divided into two groups: experimental and control. See Appendix (3) for a sample training unit within the training program.

• The experimental group

received an (8)-week training program, with (3) training units per week, based on analyzing and correcting long-serving skill performance using slow-motion video technology.

• The control group

received the same training volume and total time, but using traditional training methods without the use of slow-motion video.

The performance of all players was documented in the pre- and post-measurements, and the recordings were analyzed to identify technical developments and correct errors. In accordance with fieldwork procedures followed in similar applied studies (Gawin, Beyer, & Seidler, 2020: 112)

Tests

Pre- and post-tests were conducted using the approved model.

The test measured three indicators for each player, across 10 serve attempts:

- Number of balls that reached the target
- Number of technical errors (wrong angle, weak shot)
- Average coaches' rating of overall performance

Performance results were video documented and analyzed using visual analysis software.

See Image (1): Long serve skill execution model (Appendix 1)

Experimental Experiment

A pilot experiment was conducted on an external sample of (5) players of the same age group who did not participate in the original study. This was to verify:

- The validity of the measurement tools
- Determining the appropriate time to implement the program
- The accuracy of the video analysis
- The efficiency of the cameras and the Dartfish software

Some filming angles were modified based on the results of the experiment to avoid repetition of back-to-back shots without clear arm clarity. Statistical

Methods

The researcher used SPSS (version 25) to conduct statistical analyses, which included:

- Arithmetic means and standard deviation(Ali & Hamid, 2021; Fayyad et al., 2025; Ali et al., 2024).
- Independent T-test

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- Paired T-test
- Significance level (0.05)

Statistical methods enabled comparison of the pre- and post-test results of the two groups, and identification of statistical differences in the skill performance of the long serve.

Results

Presentation, Analysis, and Discussion of Results

The results of the long serve test before and after implementing the training program are presented for the two groups:

• Experimental group (using slow-motion video technology)

• Control group (using traditional training)

Statistical analysis included:

1. Comparison within each group (pre-post).
2. Comparison between the two groups in the post-test.

First: Results of the Experimental Group (pre-post)

See Table (2): Differences in the skill performance of the long serve in the experimental group

Indicator	Pre-test Mean	Post-test Mean	Difference	Standard Deviation	t-value	Significance Level
Number of Successful Serves	5.3	8.6	3.3	1.12	8.21	0.001
Technical Errors	4.2	1.5	-2.7	0.88	9.14	0.001
Overall Evaluation (out of 10)	5.9	8.4	2.5	1.05	6.77	0.001

Analysis

- The average number of successful serves increased by 3.3 serves, a statistically significant improvement.
- The average technical errors decreased from 4.2 to 1.5, indicating a clear improvement in technical accuracy.
- The overall rating increased from 5.9 to 8.4, reflecting a comprehensive improvement in performance.
- All statistical values are significant at the 0.001 level, supporting the first hypothesis that there was a significant improvement within the experimental group.
- The results are consistent with what Suisdareni & Tomoliyus (2021: 234) indicated regarding the effect of visual feedback on improving fine motor skills.

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The analyses also showed an improvement in the angle of the strike and the timing of the serve, as illustrated in Figure (2): the moment of executing the long serve using slow-motion video – see Appendix (2).

Second: Results for the Control Group (Pre-Post)

See Table (3): Differences in skill performance for the long serve in the control group

Indicator	Pre-test Mean	Post-test Mean	Difference	Standard Deviation	t-value	Significance Level
Number of Successful Serves	5.4	6.1	0.7	1.22	1.43	0.176
Technical Errors	4.1	3.8	-0.3	0.95	0.91	0.209
Overall Evaluation (out of 10)	5.8	6.3	0.5	0.76	1.21	0.184

Analysis

- The improvement in the number of successful serves is limited, with a difference of only 0.7 serves.
- The decrease in technical errors does not exceed 0.3 errors, which is not statistically significant.
- The overall evaluation increased by a very slight percentage (0.5) points.
- All statistical values are not significant at the 0.05 level, reflecting the weak effect of the traditional method in improving long serve skill.
- These results are consistent with what Gawin et al. (2020: 112) stated, that the absence of visual observation and real-time analysis reduces the effectiveness of training in correcting subtle errors.

Third: Comparison of post-test results between the two groups

See Table (4): Post-test differences between the experimental and control groups

Indicator	Experimental Group	Control Group	Difference	t-value	Significance Level
Number of Successful Serves	8.6	6.1	2.5	4.12	0.001
Technical Errors	1.5	3.8	-2.3	5.19	0.001
Overall Evaluation (out of 10)	8.4	6.3	2.1	3.95	0.002

Analysis

- The experimental group demonstrated a clear superiority in all three indicators.

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- The difference in the average number of successful serves in favor of the experimental group was 2.5 serves.
- The difference in technical errors (-2.3) reflects a significant decrease in errors within the experimental group.
- These results confirm the second hypothesis, which states that training using slow-motion video is superior to traditional training.

Discussion

The results indicate that training using slow-motion video was an effective tool in correcting skill errors and improving technical performance in the long serve skill among junior table tennis players.

This can be explained by the following:

- Viewing errors from multiple angles and with high clarity.
- Immediate analysis of performance by the coach, providing accurate feedback.
- Providing immediate feedback that enhances motor learning.
- Motivating players by visually improving their performance and comparing it to their previous performance.

In contrast, the control group showed limited progress, likely due to practice and repetition rather than the effectiveness of the traditional training method.

Conclusions and Recommendations

Conclusions

Based on the analysis and discussion of the statistical results, the researcher reached the following conclusions:

- Training using slow-motion video is an effective method for correcting technical errors in the long serve skill among junior table tennis players.
- The group that used slow-motion video showed significant improvement in serve accuracy and reduced technical errors compared to the group that used the traditional method.
- Visual feedback increased the player's self-awareness of their errors and accelerated performance adjustments, justifying the statistical superiority of the experimental group.
- Visual analysis software such as Dartfish enabled the coach to accurately illustrate performance angles, timing of shots, and body position.
- The traditional method did not produce significant differences in performance, which underscores the need to incorporate modern digital tools into skill training for children and juniors.
- The research results support recent trends that encourage the integration of technology into training, especially when dealing with precise skills that require advanced visual analysis. Recommendations

Based on the findings of the research, the following are recommended:

- Adopt slow-motion video technology as a primary training method for teaching fine technical skills in table tennis, especially for juniors.
- Provide video analysis programs within sports clubs and schools, and train coaches on their proper use.

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- Design training programs based on repeated observation and visual analysis, and link them to immediate assessment by the coach.
- Conduct further research to test the effect of slow-motion video on other table tennis skills, such as backhands or short defenses.
- Disseminate the results of this research to sports training federations and include them in coach development curricula.
- Raise awareness among parents and coaches about the importance of the conscious use of technology in training to improve performance without causing psychological or physical harm to juniors.
- Test the effectiveness of slow-motion training using only a mobile phone, to facilitate generalization to resource-limited settings.

References:

1. Abdullah, Hussein. (2023). Motor Learning and Developing Technical Performance. Amman: Safaa Publishing House.
2. Al-Anzi, Mustafa. (2023). The Effect of Video Analysis on Basketball Shooting. Journal of Modern Education, 10(4), 88-104.
3. Al-Dayni, Abdul Rahman. (2022). Developing Short Serve Skill in Juniors. Journal of Physical Education, 34(1), 114-132.
4. Al-Hussaini, Mohammed. (2020). Kinematic Analysis in Individual Games. Cairo: Dar Al-Fikr.
5. Ali, O., & Hamid, H. (2021). Building of Psychological Directions Parameter for Anbar Educational Directorate Teachers for non-specialty Towards Practicing Classroom and Extracurricular Activities. Anbar University Journal of Physical Sciences and Sports, 12(23), 23–46. https://doi.org/10.37655/uaspesj.2021.175083
6. Ali, O., Mushref, A., & Ali, B. (2024). The Role of Supplements in Improving Muscular Strength and Endurance in Professional Soccer Players: A Systematic Review. American Journal of Social and Humanitarian Research, 5(12), 485–497. https://doi.org/https://doi.org/10.31150/ajshr.v5i12.3116
7. Al-Jabouri, Ahmed. (2021). Basic Skills in Table Tennis. Baghdad: University of Baghdad.
8. Al-Shammari, Adel. (2020). The Effect of Using Digital Applications on Skill Training. Journal of Sports Sciences, 11(2), 44–61.
9. Al-Shammari, Muhammad Abdullah. (2022). The Effect of Using Slow-Motion Video Technology on Improving Skill Performance of Some Table Tennis Skills. Journal of Sports Sciences and Physical Education, 14(2), 45–60.
10. Al-Taie, Wissam. (2022). Using Slow-Motion Video to Correct Technical Errors. Journal of Physical Education, 19(3), 42–53.
11. Alwan, Riyadh. (2022). The Effect of Digital Analysis on Skill Performance in Table Tennis. Al-Qadisiyah University.
12. Fayyad, F. H., Hammood, Y. M., Ali, O. A., Mushref, A. J., Awad, A. K., & Shanta, A. (2025). Building and legalizing a test to measure the level of football agility of young players. Retos, 68, 1578–1590. https://doi.org/https://doi.org/10.47197/retos.v68.116368

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https://proximusjournal.com/index.php/PJSSPE
ISSN (E): 2942-9943

13. Gawin, W., Beyer, L., & Seidler, J. (2020). Effects of visual feedback training on technical skills in table tennis. *International Journal of Table Tennis Science*, 15(1), 110–118
14. Khadir, Nibras. (2020). Developing Defensive Performance in Handball Using Slow-Motion Video. Master's Thesis, University of Babylon.
15. Khalaf, H. H., Abrahim, A. A., Khaleel, N. M., Hummadi, J. N., Mushref, A. J., & Ali, O. A. (2024). THE IMPACT OF THE DINES MODEL AS AN EDUCATIONAL MEDIATOR ON COGNITIVE ACHIEVEMENT AND LEARNING OVERHEAD PASSING SKILL IN VOLLEYBALL. Proximus Journal of Sports Science and Physical Education, 1(12), 70–71.
16. Khaled, Asaad. (2023). Skill Assessment of Junior Players. Journal of Sports Performance, 9(3), 21-38.
17. Mohammed, K. J., Suleiman, K. I., Naser, M. M., Ali, O. A., & Ali, O. (2025). The effect of colorful and varied visual skill exercises on the development of sensory perception and complex skill performance among futsal players. Retos, 69, 1226–1239.
18. Naim, Khaled. (2021). Technical Performance Difficulties in Junior Table Tennis. Journal of Physical Education, 17(2), 99-110.
19. Rashid, Ziyad. (2021). The Effectiveness of Visual Programs in Developing the Smashing Serve. Journal of Sports Sciences, 12(1), 70-85.
20. Salem, Adnan. (2022). Long Serves and Their Role in Building Attacks. Baghdad: University Publishing Press.
21. Suisdareni, S., & Tomoliyus, T. (2021). The effect of drill exercise and reaction speed on the drive accuracy of beginner table tennis athletes. *Jurnal Keolahragaan*, 9(2), 231–237. https://doi.org/10.21831/jk.v9i2.43107

Appendices:

Appendix (1)

Image (1): Long serve evaluation form (hitting angle and foot position)

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(The picture shows the arm position, the distance between the foot and the racket, and the direction of the ball after hitting)

Appendix (2)

Image (2): The moment the long transmission is executed from the slow-motion video

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Appendix (3): Training unit model within the training program

General Information	Details
Unit Title	Improving Long Serve Accuracy Using Slow-Motion Video
Target Group	Junior Table Tennis Players (13–15 years)
Unit Duration	45 minutes
Repetition Frequency	3 sessions per week for 8 weeks
Venue	Official Table Tennis Hall – [Club Name]

Training Unit Components

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Stage	Duration (min)	Content
Warm-up	10	General activation exercises, arm rotation, dynamic flexibility
Main	30	- Long serve accuracy drills with video review - Hitting specific targets on the table - Serve drills with varied speed and angle
Cool-down	5	Stretching exercises, deep breathing, quick review of performance errors

Organizational Notes

- Use ITTF-approved balls.
- Record performance on video for technical error analysis.
- Repeat each drill at least 5 times.
- Introduce variation in serve angle and speed.